DISTRIBUTION SHEET

To Distribution	From Characterization Support	Page 1 of 2
		Date 1-24-95
Project Title/Work Order Tank 241-AX-102 Tank Characterization Plan (WHC-SD-WM-TP-227), Revision 1		EDT No. N/A
		ECN No. 617828

Name	MSI N	Text With All Attac h.	Text Only	Attach. / Append ix Only	EDT/E CN Only
------	----------	------------------------------------	--------------	--------------------------------------	---------------------

ONSITE

U. S. Department of Energy - Richland Field Office

C. A. Babel	S7-54	X
J. M. Clark	S7-54	X

MACTEC

J. P. Haney	S7-73	X
D. R. Lincoln	S7-73	X
J. A. Sheriff	B1-42	X

Pacific Northwest Laboratories

S. F. Bobrowski	K7-28	X
S. G. McKinley	P7-22	X

Westinghouse Hanford Company

R. Akita	T6-20	X
K. E. Bell	T6-06	X
R. N. Campeau	S7-04	X
R. J. Cash	S7-15	X
K. K. Cutsforth	S1-57	X
T. F. Dale	T6-20	X
J. L. Deichman	H4-19	X
S. J. Eberlein	S7-31	X
R. K. Fuller	T6-31	X
V. W. Hall	H4-19	X
J. G. Kristofzski	T6-06	X
J. S. Lee	S7-03	X
J. E. Meacham	S7-15	X
P. M. Morant	H4-19	X
A. D. Olguin	S7-04	X
A. D. Rice	T6-06	X
P. Sathyanarayana (2)	R2-12	X
R. D. Schreiber (5)	R2-12	X
W. M. Smithers	T7-25	X

C. L. Thomas	H4-19	X
T. C. Tribble	S1-57	X
D. A. Turner	S7-15	X
B. D. Valenzuela	T6-30	X
Central Files	L8-04	X
O.S.T.I. (2)	L8-07	X

ECN 617828
Page 2 of 2

OFFSITE

U. S. Department of Energy - Headquarters
Office of Environmental Restoration and
Waste Management EM-563
12800 Middlebrook Road
Germantown, MD 20874

K. T. Lang	X
J. A. Poppiti	X

Los Alamos Technical Associates
750 Swift, Suite 14
Richland, WA 99352

A. T. Dicenso	X
C. J. Lindquist	X
T. T. Tran	X
G. P. Westleigh	X

MASTER

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

COMPLETE

H

ENGINEERING CHANGE NOTICE

Page 1 of 31. ECN **N_o 617828**Proj.
ECN

2. ECN Category (mark one) Supplemental ☐ Direct Revision ☒ Change ECN ☐ Temporary ☐ Standby ☐ Supersedure ☐ Cancel/Void ☐		3. Originator's Name, Organization, MSIN, and Telephone No. R. D. SCHREIBER, 71520, R2-12, 373-5589		4. Date 1-20-95	
		5. Project Title/No./Work Order No. TANK 241-AX-102 TANK CHARACTERIZATION PLAN		6. Bldg./Sys./Fac. No. 241-AX	
		8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-WM-TP-227, REV. 0		9. Related ECN No(s). N/A	
				7. Impact Level Q	
				10. Related PO No. N/A	
11a. Modification Work [] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)		11b. Work Package No. N/A		11c. Modification Work Complete N/A _____ Cog. Engineer Signature & Date	
				11d. Restored to Original Condition (Temp. or Standby ECN only) N/A _____ Cog. Engineer Signature & Date	
12. Description of Change Added requirements from Organic Safety Program Data Quality Objective.					
13a. Justification (mark one) Criteria Change ☒ Design Improvement ☐ Environmental ☐ As-Found ☐ Facilitate Const. ☐ Const. Error/Omission ☐ Design Error/Omission ☐					
13b. Justification Details Tank 241-AX-102 was added to the Organic Watch List, meaning the Organic DQO needed to be incorporated into the Tank Characterization Plan.					
14. Distribution (include name, MSIN, and no. of copies) See attached Distribution Sheet				RELEASE STAMP OFFICIAL RELEASE 5 BY WHC DATE JAN 24 1995 <i>Sta. 4</i>	

A-7900-013-2 (06/92) GEF095

A-7900-013-1

ENGINEERING CHANGE NOTICE

Page 2 of 23

1. ECN (use no. from pg. 1)

617828

15. Design Verification Required [] Yes [X] No	16. Cost Impact				17. Schedule Impact (days) Improvement [] Delay []
	ENGINEERING		CONSTRUCTION		
	Additional [] \$	Savings [] \$	Additional [] \$	Savings [] \$	

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD []	Seismic/Stress Analysis []	Tank Calibration Manual []
Functional Design Criteria []	Stress/Design Report []	Health Physics Procedure []
Operating Specification []	Interface Control Drawing []	Spares Multiple Unit Listing []
Criticality Specification []	Calibration Procedure []	Test Procedures/Specification []
Conceptual Design Report []	Installation Procedure []	Component Index []
Equipment Spec. []	Maintenance Procedure []	ASME Coded Item []
Const. Spec. []	Engineering Procedure []	Human Factor Consideration []
Procurement Spec. []	Operating Instruction []	Computer Software []
Vendor Information []	Operating Procedure []	Electric Circuit Schedule []
OM Manual []	Operational Safety Requirement []	ICRS Procedure []
FSAR/SAR []	IEFD Drawing []	Process Control Manual/Plan []
Safety Equipment List []	Cell Arrangement Drawing []	Process Flow Chart []
Radiation Work Permit []	Essential Material Specification []	Purchase Requisition []
Environmental Impact Statement []	Fac. Proc. Samp. Schedule []	
Environmental Report []	Inspection Plan []	
Environmental Permit []	Inventory Adjustment Request []	

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number/Revision
N/A	N/A	N/A

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog Engineer R. D. SCHREIBER <i>R.D. Schreiber</i>	1/20/95	PE	
Cog. Mgr. C. S. HALLER <i>C. S. Haller</i>	1/17/95	QA	
QA K. K. CUTSFORTH <i>T.C. Farn</i>	1/23/95	Safety	
Safety		Design	
Security		Environ.	
Environ.		Other	
Projects/Programs			
Tank Waste Remediation System			
Facilities Operations			
Restoration & Remediation			
Other J. G. KRISTOFZSKI <i>J.G. Kristofzski</i>	1-20-95	DEPARTMENT OF ENERGY	
S. G. MCKINLEY <i>S.G. McKinley</i>	1-20-95	Signature or Letter No.	
V. W. HALL <i>R.D. Schreiber for CL Thomas per telecon</i>	1-20-95	ADDITIONAL	
D. A. TURNER <i>D.A. Turner</i>	1-20-95		
W. J. KENNEDY <i>W.J. Kennedy</i>	1-20-95		

REVIEW COMMENT RECORD (RCR)		1. Date		2. Review No.	
		3. Project No.		4. Page 1 of	
5. Document Number(s)/Title(s) WHC-SD-WM-TP-227, REV. 1/Tank 241-AX-102 Tank Characterization Plan		6. Program/Project/ Building Number Tank Farms		7. Reviewer A. D. Rice	
		8. Organization/Group 222-S Lab Program Support		9. Location/Phone 200W/M0028	
17. Comment Submittal Approval:		10. Agreement with indicated comment disposition(s)		11. CLOSED	
Organization Manager (Optional)		Date <u>1/20/95</u>		Reviewer/Point of Contact <u>X. Au S. Du</u> Date _____	
		Author/Originator <u>R. D. Achua</u>		Reviewer/Point of Contact Date _____	
		Author/Originator		Author/Originator	
12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)		16. Status
1	The Organic Safety Program has requested TOC analysis by furnace oxidation as a secondary analysis. The WHC 222-S Laboratory does not have the capability to run this analysis on solid samples (the sample is injected into the instrument).				

RELEASE AUTHORIZATION

Document Number: WHC-SD-WM-TP-227, REV.1

Document Title: TANK 241-AX-102 TANK CHARACTERIZATION PLAN

Release Date: January 24, 1995

**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Kara M. Broz

January 24, 1995

TRADEMARK DISCLAIMER. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy. Available in paper copy and microfiche. Printed in the United States of America. Available to the U.S. Department of Energy and its contractors from:

U.S. Department of Energy
Office of Scientific and Technical Information (OSTI)
P.O. Box 62
Oak Ridge, TN 37831
Telephone: (615) 576-8401

Available to the public from: U.S. Department of Commerce
National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Telephone: (703) 487-4650

SUPPORTING DOCUMENT

1. Total Pages *2729*
P24

2. Title

TANK 241-AX-102 TANK CHARACTERIZATION PLAN

3. Number

WHC-SD-WM-TP-227

4. Rev No.

1

5. Key Words

CHARACTERIZATION, DQO, SAFETY SCREENING, QUALITY CONTROL, SINGLE-SHELL TANK, SAMPLING, ANALYSIS, TANK CHARACTERIZATION PLAN, ORGANIC WATCH LIST

6. Author

Name: R. D. SCHREIBER

R.D. Schreiber
Signature

Organization/Charge Code 71520/N4168

7. Abstract

This document is a plan which serves as the contractual agreement between the Characterization Program, Sampling Operations, WHC 222-S Laboratory, and PNL 325 Analytical Chemistry Laboratory. The scope of this plan is to provide guidance for the sampling and analysis of samples from tank 241-AX-102.

8. RELEASE STAMP

OFFICIAL RELEASE	5
BY WHC	
DATE	JAN 24 1995
<i>Ator</i>	

RECORD OF REVISION		(1) Document Number WHC-SD-WM-TP-227		Page 1
(2) Title TANK 241-AX-102 TANK CHARACTERIZATION PLAN				
CHANGE CONTROL RECORD				
(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release		
		(5) Cog. Engr.	(6) Cog. Mgr.	Date
0	(7) WHC-SD-WM-TP-227, REV 0, EDT 159070, August 26, 1994			
1 RS	Full revision, ECN 617828	<i>R.D. Achard</i>	<i>J. Mallin</i>	1/19/95

Tank 241-AX-102 Tank Characterization Plan

Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

CONTENTS

SAMPLE EVENT A: AUGER SAMPLING IN FISCAL YEAR 1995

1.0	SPECIFIC TANK CHARACTERIZATION OBJECTIVES	1
1.1	RELEVANT SAFETY ISSUES	1
1.1.1	Tank AX-102 Characterization Objectives	2
1.1.2	Safety Screening and Organic Data Quality Objectives	2
1.1.3	Data Quality Objectives Integration	2
1.2	RELEVANT SAFETY INFORMATION	3
1.2.1	Tank Status	3
1.2.2	Tank Monitoring Activities	3
2.0	SUMMARY OF HISTORICAL INFORMATION FOR TANK AX-102	4
2.1	CONFIGURATION	4
2.2	PROCESS HISTORY	4
2.3	HISTORICAL SAMPLING EVENTS	4
3.0	SCHEDULED SAMPLING EVENT	7
3.1	SAMPLE COLLECTION AND TRANSPORT	7
3.2	TANK-SPECIFIC ANALYTICAL PROCEDURES	7
3.2.1	Hot Cell Sample Isolation and Analysis Scheme	7
3.2.2	Priorities of Requested Analyses	14
3.2.3	Analytical Methods	14
4.0	QUALITY ASSURANCE/QUALITY CONTROL	14
4.1	SAMPLING OPERATIONS	14
4.2	LABORATORY OPERATIONS	15
5.0	ORGANIZATION	19
6.0	EXCEPTIONS, CLARIFICATIONS, AND ASSUMPTIONS	19
6.1	EXCEPTIONS TO DQO REQUIREMENTS	19
6.2	CLARIFICATIONS AND ASSUMPTIONS	20
7.0	DELIVERABLES	21
7.1	FORMAT I REPORTING	21
7.2	FORMAT III REPORTING	21
7.3	FORMAT IV REPORTING	22
8.0	CHANGE CONTROL	22
9.0	REFERENCES	23

LIST OF TABLES

1a: Analytical Results for Tank AX-102 Sludge Samples	6
1b: Analytical Results for Tank AX-102 Supernatant Samples	7
2: AX-102 Chemical, Radiological, and Physical Analytical Requirements .	16
3: Tank AX-102 Project Key Personnel List	19

LIST OF FIGURES

1: Process History of Tank 241-AX-102	5
2: Solid Analysis Flow Chart	11
3: Liquid Analysis Flow Chart	12
4: Sample Analysis and Reporting Flow Chart	13

LIST OF ACRONYMS

ACL	Analytical Chemistry Laboratory
AX-102	Tank 241-AX-102
CASS	Computer Automated Surveillance System
CC	concentrated complexant
DNFSB	Defense Nuclear Facility Safety Board
DOE	Department of Energy
DQO	data quality objective
DSC	differential scanning calorimetry
DST	double-shell tank
GEA	gamma energy analysis
HPGE/MCA	high purity germanium - multi channel analysis
ICP	inductively-coupled plasma
PUREX	Plutonium-Uranium Extraction
RSST	reactive system screening tool
SST	single-shell tank
TCP	Tank Characterization Plan
TGA	thermogravimetric analysis
TIC	total inorganic carbon
TPA	Tri-Party Agreement
TOC	total organic carbon
TWRS	Tank Waste Remediation System
USQ	unreviewed safety question
WHC	Westinghouse Hanford Company

1.0 SPECIFIC TANK CHARACTERIZATION OBJECTIVES

The Defense Nuclear Facilities Safety Board has advised the DOE to concentrate the near-term sampling and analysis activities on identification and resolution of safety issues (Conway 1993). The data quality objective (DQO) process was chosen as a tool to be used to identify sampling and analytical needs for the resolution of safety issues. As a result, a revision in the Federal Facility Agreement and Consent Order (TPA) milestone M-44-00 has been made, which states that "A Tank Characterization Plan (TCP) will also be developed for each DST and SST using the DQO process...Development of TCPs by the DQO process is intended to allow users (e.g., Hanford Facility user groups, regulators) to ensure their needs will be met and that resources are devoted to gaining only necessary information." This document satisfies this requirement for the tank 241-AX-102 (AX-102) fiscal year 1995 safety screening activity.

This Tank Characterization Plan will identify characterization objectives pertaining to sample collection, hot cell sample isolation, and laboratory analytical evaluation and reporting requirements in accordance with the *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994), in addition to reporting the current contents and status of the tank as projected from historical information.

1.1 RELEVANT SAFETY ISSUES

There are four Watch List tank classifications (ferrocyanide, organic, flammable (hydrogen) gas, and high heat load). These classifications cover the six safety issues related to public and worker health that have been associated with the Hanford Site underground storage tanks: ferrocyanide, organic, flammable gas, criticality, high heat, and vapor (Babad 1992). Tank AX-102 is one of the twenty tanks currently on the Organic Watch List (Hanlon 1994). This TCP will identify characterization objectives pertaining to sample collection, hot cell sample isolation and laboratory analytical evaluation and reporting requirements in accordance with the appropriate DQO documents. In addition, the current contents and status of the tank are projected from historical information.

The organic safety issue arises due to wastes added to SSTs containing quantities of complexants used in waste management operations, as well as degradation products of these complexants and solvents used in fuel reprocessing and metal recovery operations. These waste tanks also contain a presumed stoichiometric excess of sodium nitrite and sodium nitrate that are sufficient to exothermally oxidize the organic compounds in the tank.

The relevant safety issues that are of concern for tanks on the Organic Watch List are as follows:

- ▶ The potential for an exothermic reaction occurring from the flammable mixture of organic materials and nitrate/nitrite salts that could result in a release of radioactive material.
- ▶ The possibility that other safety issues may exist for the tank.

1.1.1 Tank AX-102 Characterization Objectives

The characterization effort applicable to this TCP is focused on the relevant safety issues listed above. The two key safety questions that should be answered from analytical data on tank AX-102 waste are as follows:

- ▶ Is the tank SAFE and/or does it belong on the Organic Watch List?
- ▶ Is the tank CONDITIONALLY SAFE or UNSAFE?

Based on the answers to these two questions, actions will be identified and implemented to mitigate or remediate the conditions that resulted in classifying the tank as UNSAFE (Babad et al. 1994).

1.1.2 Safety Screening and Organic Data Quality Objectives

The sampling and analysis needs associated with organic watch list tanks, as well as the safety screening of all tanks, have been identified through the data quality objective (DQO) process. Additional data needs associated with tank AX-102 may be identified in subsequent DQO efforts.

Pertinent documents to this effort include the following:

- ▶ *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994), which describes the sampling and analytical requirements for screening all waste tanks for unidentified safety issues. The criteria for placing a tank on a particular Watch List are specified in this document.
- ▶ *Data Quality Objective to Support Resolution of the Organic Fuel Rich Tank Safety Issue* (Babad et al. 1994), which describes the sampling and analytical requirements for tanks on the Organic Watch List, including tank AX-102.

1.1.3 Data Quality Objectives Integration

The organic and safety screening DQO efforts both require samples to be taken from a minimum of two risers separated radially to maximum extent possible by the existing risers. Such sampling can be done by core drilling, by auger sampling (for shallow tanks) and/or by obtaining liquid supernate samples at several levels (Babad and Redus 1994). Tank AX-102 contains a shallow depth and high-solids waste that will be sampled for safety screening purposes using the auger sampling method. For sample breakdown, both the organic and safety screening DQOs require tank samples to be analyzed in half-segments.

The analytes identified in the safety screening DQO for the various safety issues are a subset of the suite of analyses identified in the organic DQO with the exception of the analytes measured for the criticality safety issue. If any notification limits for immediate reporting of analytes identified in the DQOs were conflicting, the more stringent limits of the DQO efforts were used in this Tank Characterization Plan.

The analytical requirements for the safety screening of a tank are concerned with identifying a common set of primary analytes and characteristics of the waste. These analytes are energetics, total alpha activity, moisture and flammable gas concentrations. If a specific criteria level on one of these items is exceeded, further analysis of a secondary set of analytes and a possible Watch-List tank classification would be warranted. Further details of the analytical procedures and criteria to be followed for this tank AX-102 sampling and characterization event are given in Section 3.2.

This Tank Characterization Plan identifies procedures and requirements, in accordance with the safety screening DQO, organic DQO, and the Characterization Program, for collecting and characterizing a sample from tank AX-102 by the auger sampling method.

1.2 RELEVANT SAFETY INFORMATION

1.2.1 Tank Status

Single-shell tank AX-102 is classified as an Organic Watch List tank. In 1988 tank AX-102 was identified as an assumed leaker and interim stabilized by supernatant pumping. To prevent further waste additions to the tank, it has been isolated and designated as an Intrusion Prevention (IP) tank.

Tank AX-102 is reported as containing approximately 25.4 cm (10 in) of waste material which consists of 110,000 Liters (29 kgal) of saltcake, 26,500 Liters (7 kgal) of sludge, and 11,400 Liters (3 kgal) of supernatant liquid for a total of 148,000 Liters (39 kgal) (Hanlon 1994). Results obtained from the CASS database are variable and indicate a waste depth of 19-35.6 cm (7.5-14 in) with the most recent reading at 24 cm (9.5 in). A 25.4 cm (10 in) depth corresponds to a maximum waste volume in tank AX-102 of 104,000 Liters (27.5 kgal). Its contents are categorized as concentrated complexant waste material (CC).

1.2.2 Tank Monitoring Activities

All 18 thermocouples on the single thermocouple tree in tank AX-102 are positioned above the solids level and in the vapor space. The temperature of the waste from the lowest (in depth) thermocouple in tank AX-102 was recorded at 115°F in January 1994. The waste surface level is measured by a manual tape. Nine active dry wells, installed in 1970, monitor radiation in the surrounding soil (Hanlon 1994).

2.0 SUMMARY OF HISTORICAL INFORMATION FOR TANK AX-102

This section summarizes some of the available information for tank AX-102. Discussions of the process history, recent sampling events for the tank, and general information about the tank are included.

2.1 CONFIGURATION

Tank AX-102 is one of 4 single-shell tanks in the 200 East area AX Farm constructed during 1963-64. It is 75 feet in diameter with a flat bottom and has a 3,790,000 Liter (1,000 kgal) tank capacity. Tank AX-102 is passively ventilated and does not cascade with any other of the AX Farm tanks. Ten of the 58 risers are available for use.

2.2 PROCESS HISTORY

Tank AX-102 began receiving PUREX high level and organic wash waste in the third quarter of 1966 and continued to receive these wastes until the fourth quarter of 1968, when it was declared a spare tank. In the first quarter of 1969 through the third quarter of 1975, the tank received B Plant high level waste. From the fourth quarter of 1975 to the second quarter of 1976, the tank was sluiced to recover strontium and cesium. From the third quarter of 1976 until the second quarter of 1977, the tank received evaporator feed. In 1977, a P-10 pump was installed to later be used for supernatant pumping. From the third quarter of 1977 to the first quarter of 1978, the tank received residual liquor from the 242-A evaporator. From the second quarter of 1978 to 1980 the tank received either complexant waste or concentrated complexant waste

In 1980, the tank was declared inactive. During 1982, intrusion prevention status was achieved. A level adjustment was made in the fourth quarter of 1983. In 1988, the tank was declared an assumed leaker from an estimated leak to the surrounding soils of 3,000 gallons and it was immediately interim stabilized by supernatant pumping. Figure 1 summarizes the waste transfer history and waste levels.

2.3 HISTORICAL SAMPLING EVENTS

Historical data is available from five samples retrieved from tank AX-102 in September 1974, July 1977, January 1980, February 1980, and November 1988. The latter two samples are the most complete and occurred after the last waste additions. However, they are supernatant samples and since much of the supernatant has been removed these results are given less significance. The sludge samples taken in 1974 and 1977 have limited data but are viewed to be more closely representative of the present tank contents. The sludge sample results are given in Table 1a.

Table 1a: Analytical Results for Tank AX-102 Sludge Samples

Sample Date	1974	1977
Sample Description	Soft Reddish Brown Sludge	Dark Reddish Brown Sludge
Wet Density	1.57 g/ml	--
Dry Density	0.9025 g/ml	--
Component	Concentration ($\mu\text{g/g}$)	
Ba	100	--
Ca	5,200	--
Mg	700	--
Mn	7,700	--
Fe	91,000	--
Si	22,000	--
Wt% H ₂ O	42.5%	--
Component	Concentration ($\mu\text{Ci/L}$)	
¹³⁷ Cs	4.78E+2	6.5E+5
⁸⁹⁺⁹⁰ Sr ($\mu\text{Ci/L}$)	9.31E+6	1.7E+7
⁶⁰ Co	1.31E+4	--
¹²⁵ Sb	1.51E+5	6.2E+5
¹⁴⁴ Ce ¹⁴⁴ Pr	2.38E+7	1.4E+6*
¹⁵⁴ Eu	3.51E+5	--
Pu (g/L)	6.71E-2	8.8E-2

*¹⁴⁴Ce results only
(Brevick 1994)

Results from a supernatant sample taken in August 1988 indicate a high level of sodium, carbonate, organic carbon, nitrate, nitrite, and sulfate (see Table 1b). With the exception of carbonate compounds, these analytes are very soluble and are likely less concentrated in the solids.

Table 1b: Analytical Results for Tank AX-102 Supernatant Samples

Component	Concentration ($\mu\text{g/g}$)**
pH	1.13E+1
Na	1.70E+5
CO ₃	5.90E+4
TOC	3.70E+4
NO ₃	2.30E+5
NO ₂	6.40E+4
SO ₄	1.60E+4

** These values were converted from molar concentrations by assuming a bulk density of 1 g/ml.

3.0 SCHEDULED SAMPLING EVENT

3.1 SAMPLE COLLECTION AND TRANSPORT

In fiscal year 1995, tank AX-102 auger samples will be taken from risers 3A and 9E. 20 cm (8 in) of sludge (approximately 300 g) are expected to be recovered from each auger sample. No drainable liquids are expected to be recovered; however, some liquids may be contained in the waste. For specific information concerning sample handling, custody, and transport refer to quality assurance/quality control requirements in Section 4.1. Documents which contain applicable operating procedures and chain of custody requirements for the AX-102 auger sampling activities are procedure TO-080-500 and work package 2E-94-00701.

3.2 TANK-SPECIFIC ANALYTICAL PROCEDURES

Any decisions, observations, or deviations to this characterization plan made during sample receipt, isolation, and analysis will be documented in the deliverable report.

3.2.1 Hot Cell Sample Isolation and Analysis Scheme

Before sample removal and breakdown begins, H. Babad or another delegate of the Characterization Program should be contacted so that they may be present to observe the sample breakdown. Because of the limited turn-around time for the safety screening analyses, the laboratory will not delay sample breakdown more than 4 hours to accommodate program observers. The sample isolation and breakdown procedure will follow guidelines provided in this Tank Characterization Plan.

A flowchart depicting the general sample breakdown and analysis scheme is presented in Figure 2, 3, and 4. These steps are described in detail to provide the

hot cell and laboratory chemists with guidance for the breakdown of the segments and may be altered as appropriate by the performing laboratory. Several analyses listed in Table 2 require a 45 day reporting time, as noted. The 45 day reporting format, Format III, is explained in Section 7.2.3.

As a precautionary measure, the Safety and Analysis Report for Packaging (SARP) has been reviewed for any safety issues involved with the transportation of AX-102 auger samples. Auger samples from tank AX-102 can have a maximum sealed time of 15 days. Therefore, if analysis of AX-102 auger samples cannot be performed within this time the sample must be vented every 15 calendar days to allow for the venting of any retained gas.

Any decisions, observations, or deviations made to this work plan or during the sample breakdown shall be documented in writing (with appropriate justification) in the data report. The reporting formats for analyses are contained in Table 2.

- Step 1 Receive auger samples at the laboratory in accordance with approved procedures.
- Step 2 Conduct the following on the material from each extruded auger sample:
 - ▶ Perform a visual examination of the sample(s)
 - ▶ Record observations. This may include a sketch of the sample in addition to written documentation of pertinent descriptive information such as color, texture, homogeneity, and consistency.
 - ▶ Take color photographs and/or a videotape to visually document the isolated samples.
- Step 3 Separate any drainable liquid from the solids. Measure and record the volume. Retain drainable liquids for further processing.
- Step 4 Is the sample 100% drainable liquid?
 - Yes: Proceed to Step 12
 - No: Proceed to Step 5A

SOLIDS PATH

- Step 5A Is there a hard, dry layer on the top portion of the auger sample?
 - Yes: Proceed to Step 5B
 - No: Proceed to Step 6
- Step 5B Separate the hard, dry layer and retain for analysis.
- Step 6 Divide the remaining auger sample into two equal subsamples "half-segment".
- Step 7 Homogenize each subsample using the appropriate approved procedure.

Step 8 Will a homogenization test be performed?

Yes: Proceed to Step 9

No: Proceed to Step 10

NOTE: One subsample per auger sample, at a minimum, should be used for the homogenization test. Additional tests may be performed at the laboratory's discretion.

Step 9 Conduct the homogenization test by taking a 1 to 2 gram aliquot from widely separated locations of the homogenized subsample. Conduct the homogenization test in accordance with Bell (1993).

Step 10 Collect sufficient aliquots from each homogenized subsample to perform the appropriate preparations and analyses listed in Table 2 in duplicate.

NOTE: If there is an insufficient amount of sample available in any subsample to perform all required analyses on the half segment, notify the Characterization Program within one business day and follow the analysis priorities given in Section 3.3.

Step 11 Remove at least 20 mL and up to 40 mL of each homogenized subsample for the archive sample (Bratzel 1994).

LIQUIDS PATH

Step 12 Closely inspect the liquid sample for the presence and approximate volume of any potential organic layers. Does the sample contain any immiscible (potential organic) layers?

Yes: Proceed to Step 13A

No: Proceed to Step 14

Step 13A Report any visually observed immiscible (potential organic) layer immediately by the early notification system.

Step 13B Separate and retain the potential organic layer for possible future analysis.

NOTE: Steps 14 through 18 shall be performed on the remaining (probable aqueous) liquid layer only.

Step 14 Filter the remaining liquid sample through a 0.45 micron filter.

Step 15 Is there greater than 1 gram of solid on the filter?

Yes: Proceed to Step 16

No: Proceed to Step 17

Step 16 Archive the solids for possible future analysis (Bratzel 1994).

WHC-SD-WM-TP-227, REV. 1

- Step 17 Remove sufficient aliquots from the segment-level liquid sample to perform the appropriate analyses listed in Table 2 in duplicate.
- Step 18 Archive at least 20 mL and up to 40 mL of the segment-level drainable liquid as the segment level liquid archive (Bratzel 1994).

PRIMARY ANALYSIS PATH

- Step 19 Perform primary analyses as listed in Table 2.
- Step 20 Compare the primary analysis data with notification limits.
- Step 21A Do the results exceed the notification limits (Table 2)?
- Yes: If the results exceed the notification limits. Proceed to Step 21B.
- No: If results do not exceed the notification limits, proceed to Step 24.
- Step 21B Report results exceeding the notification limits using Format I reporting deliverable requirements as listed in Section 7.1.

SECONDARY ANALYSIS PATH

- Step 22 Perform secondary analyses according to Table 2.
- Step 23A Do the secondary analyses exceed the notification limits?
- Yes: Proceed to Step 23B
- No: Proceed to Step 24
- Step 23B Report results exceeding the notification limits using Format I reporting deliverable requirements as listed in Section 7.1.
- Step 24 Report results as listed in Section 7.0.

Figure 2: Sludge Analysis Flow Chart

Figure 3: Liquid Analysis Flow Chart

ANALYSES PATH

Figure 4: Sample Analysis and Reporting Flow Chart

3.2.2 Priorities of Requested Analyses

A list of analyses to be performed for the tank safety screening and organic programs have been prioritized below. Confirmation of analysis priorities or revision of sample breakdown procedures may be provided based upon the sample recovery, readily observable physical physical property distinctions within the sample, and the requested sample breakdown procedures provided in Section 3.2.1

PRIORITY LEVEL 1

The DSC, TGA, total organic carbon (TOC) by Hot Persulfate, and total alpha analyses shall be performed.

PRIORITY LEVEL 2

Cyanide (CN), RSST, total organic carbon (TOC) by Furnace Oxidation, hydroxide (OH), nitrate (NO₃), nitrite (NO₂), ^{239/240}Pu, Fe, Mn, U, and gravimetric analysis shall be performed.

PRIORITY LEVEL 3

Cr analyses shall be performed.

3.2.3 Analytical Methods

Table 2 summarizes the analyses to be performed as well as the corresponding laboratory procedure numbers. All analyses, except RSST adiabatic calorimetry, are requested to be performed in duplicate at the performing laboratory. If the performing laboratory is not the 222-S Laboratory, arrangements shall be made by the performing laboratory for transport of one or more waste samples to the 222-S Laboratory for RSST analysis.

Any analyses prescribed by this document, but not performed, shall be identified with justification for non-performance in the appropriate data report. Also in this situation, Characterization Support and Analytical Services personnel shall be contacted (Section 5.0, Table 3).

4.0 QUALITY ASSURANCE/QUALITY CONTROL

4.1 SAMPLING OPERATIONS

Auger samples are to be taken and shipped to the performing laboratory by Sampling Operations in accordance with the Work Package 2E-94-00701. That work package shall also initiate the chain-of-custody form. Approved operating procedures for obtaining an auger sample are provided in procedure TO-080-500 and cask loading and transport procedure TO-080-090.

When a decision is made to perform the sampling activity, Analytical Services Program Management and Integration will designate the performing laboratory based on availability and capacity. The sampling and transportation documentation shall be revised to identify the assignment of the performing laboratory.

The auger samples are to be shipped in a cask and sealed with a waste tank sample seal. All sample shipments are identified by a unique number and labeled with the following information:

WASTE TANK SAMPLE SEAL

Supervisor	Sample No.
Date of Sampling	Time of Sampling
Shipment No.	Serial No.

Sampling Operations should send the samples to the laboratory preferably within one working day, but must send the samples within three calendar days of removing each sample from the tank. Sampling Operations is responsible for verbally notifying the project coordinator at the 222-S Laboratory (373-2435) at least 24 hours in advance of an expected shipment. If the performing laboratory is the 325 Analytical Chemistry Laboratory (ACL), Sampling Operations shall notify the project manager (376-2639) at least 72 hours in advance of an expected shipment so that proper shift coverage can be planned.

The sampling team is responsible for documenting any problems and procedural changes affecting the validity of the sample in a field notebook in addition to recording this information in the comment section of the chain-of-custody form.

4.2 LABORATORY OPERATIONS

The sample receipt and control procedures used in the Pacific Northwest Laboratories 325 ACL are described in PNL-ALO-051. Procedures used in the Westinghouse Hanford 222-S Laboratory are described in LO-090-101.

Analyses and quality assurance/quality control performed at the 325 ACL shall be guided by the 325 Laboratory Quality Assurance Project Plan (Kuhl-Klinger 1994). The 222-S Laboratory has a quality assurance program plan (Meznarich 1994) and a quality assurance project plan (Taylor 1993) that shall provide the quality assurance/quality control requirements for analyzing the tank waste samples at the 222-S Laboratory. Additionally, the *Hanford Analytical Services Quality Assurance Plan* (DOE 1994), when implemented, shall be used as quality assurance/quality control guidance.

Method specific quality control such as calibrations and blanks are also found in the analytical procedures. Sample quality control (duplicates, spikes, standards) are identified in Table 2. If no criteria are provided in Table 2, the performing laboratory shall perform to its quality assurance plan(s).

Table 2: AX-102 Chemical, Radiologi

SOLID							
Project Name			AX-102 Auger Sample				
Plan Number			WHC-SD-WM-TP-227, REV. 1				Homogen
							Field Blar
PROGRAM			PROGRAM CONTACTS				Hot Cell E
A. Safety Screening			Safety Screening		H. Babad		
C. Organic			Organic		D. A. Turner		
			TWRS		R. D. Schreiber		TA
			222-S Laboratory		J. G. Kristofzski		AX
			325 Laboratory		S. G. McKinley		
PROGRAM	PRIMARY ANALYSES				SAMPLE ¹		PREP ²
	METHOD	ANAL.	WHC PROCEDURE	PNL PROCEDURE	½ SEG SLDG	½ SEG SC	
A,C	DSC	Energy	LA-514-113	PNL-ALO-508	X	X	d ⁶
A,C	TGA	% H ₂ O	LA-560-112	PNL-ALO-508	X	X	d ⁶
A	Alpha	Total Alpha	LA-508-101	PNL-ALO-421 PNL-ALO-423	X		f or a
A,C	Hot Persulfate	TOC	LA-342-100	PNL-ALO-381	X ¹²	X ¹²	d ⁶
PROGRAM	SECONDARY ANALYSES				SAMPLE ¹		PREP ²
	METHOD	ANAL.	WHC PROCEDURE	PNL PROCEDURE	½ SEG SLDG	½ SEG SC	
A,C	RSST ¹⁰	Energy	see 10 below	N/A	X	X	d ⁶
A	Distillation ¹⁰	CN	LA-695-102	PNL-ALO-287 PNL-ALO-289	X	X	d ⁶
A	Sep. & α counting ¹¹	Pu-239/240	LA-503-156	PNL-ALO-423 PNL-ALO-422	X		f
A	ICP ¹¹	Fe U	LA-505-151	PNL-ALO-211	X		f or a
A,C	ICP ^{11,15}	Mn	LA-505-151	PNL-ALO-211	X		f or a
C	ICP ¹⁵	Cr	LA-505-151	PNL-ALO-211	X		f or a
C	IC ¹³	NO ₂ ⁻ NO ₃ ⁻	LA-533-105	PNL-ALO-212	X		w
C	Titration ¹³	OH ⁻	LA-661-103	PNL-ALO-228	X		d ⁶
A,C	Furnace Oxidation ¹⁴	TOC	LA-344-105	PNL-ALO-380	X	X	d ⁶
C	Gravimetric ¹⁶	% H ₂ O	LA-564-101	PNL-ALO-504	X		d ⁶

¹½ SEG SLDG-½ segment, sludge; ½ SEG SC-½ segment, saltcake

²d-direct, f-fusion dissolution, a-acid dissolution, w-water dissolution

³PR-precision, AC-accuracy, ea-each, smpl-sample, DUP-duplicate, SPK/MSD-spike and matrix spike duplicate, AE

⁴Units for notification limits and expected range are those listed in the "units" column.

1, and Physical Analytical Requirements

ANALYSES

COMMENTS			REPORTING LEVELS	
on Test - Per Laboratory Discretion Not Required c - Per Laboratory Discretion			FORMAT I	Early Notify
			FORMAT II	Process Control
			FORMAT III	Safety Screen
			FORMAT IV	Waste Management
			FORMAT V	RCRA Compliance
	#AUGERS	RISER#	FORMAT VI	Special
2	2	3A and 9E		

QUALITY CONTROL ³						CRITERIA			FOR- MAT
DUP	SPK/ MSD	BLK	CALIB STD	PR	AC	UNITS	NOTIFICATION LIMIT ⁴	EXPECTED RANGE ⁴	
a smpl	N/A	N/A	ea AB	±10	90-110	J/g ⁵	> 481	unknown	I, III, IV
a smpl	N/A	N/A	ea AB	±10	90-110	wt%	< 17	34 to 51	I, III, IV
a smpl	1/mtrx	ea PB	ea AB	±10	90-110	µCi/g	> 41	unknown	I, III
a smpl	1/mtrx	ea PB	ea AB	±10	90-110	µg C/g	> 30,000	unknown	I, III ¹² , IV

QUALITY CONTROL ³						CRITERIA			FOR- MAT
DUP	SPK/ MSD	BLK	CALIB STD	PR	AC	UNITS	NOTIFICATION LIMIT ⁴	EXPECTED RANGE ⁴	
a smpl	N/A	N/A	ea AB	±20	80-120	J/g	> 481	unknown	I, III, IV
a smpl	1/mtrx	ea PB	ea AB	±10	90-110	µg/g	> 39,000	unknown	I, III, IV
a smpl	1/mtrx ⁸	ea PB	ea AB	±15	85-115	µCi/g	> 41	unknown	I, III, IV
a smpl	see ⁹	ea PB	ea AB	±10	90-110	µg/g	none	72,800 to 109,000	III, IV
a smpl	see ⁹	ea PB	ea AB	±10	90-110	µg/g	none	unknown	III, IV
a smpl	see ⁹	ea PB	ea AB	±10	90-110	µg/g	none	6,160 to 9,240	III, IV
a smpl	see ⁹	ea PB	ea AB	±10	90-110	µg/g	none	unknown	III, IV
a smpl	1/mtrx	ea PB	ea AB	±10	90-110	µg/g	none	unknown	IV
a smpl	1/mtrx	ea PB	ea AB	±10	90-110	µg/mL	none	unknown	IV
a smpl	1/mtrx	ea PB	ea AB	±10	90-110	µg C/g	> 30,000	unknown	I, III, IV
a smpl	N/A	N/A	ea AB	±20	80-120	wt%	< 17	34 to 51	I, IV

analytical batch, PB-preparation blank, N/A-not applicable, mtrx-matrix

Table 2: AX-102 Chemical, Radiologi

⁵Dry weight basis.

⁶Direct liquid samples may be diluted in acid or water to adjust to proper sample size and/or pH.

⁸Tracer or carrier may be used in place of a spike and results corrected for recovery.

⁹Either serial dilutions or matrix spikes will be performed.

¹⁰This analysis required if DSC exceeds notification limits. The RSST method, yet to be proceduralized, may be fou

¹¹Performed only if total alpha exceeds notification limit.

¹²These analyses are primary analyses for the organic DQO, but also are secondary analyses for the safety screeni
and reported within 90 days of receipt of the last sample at the laboratory dock.

¹³This analysis is required if the energy equivalent of the TOC assay by hot persulfate is > 125% of the DSC value.

¹⁴This analysis required if the energy equivalent of the TOC by hot persulfate is < 75% of the DSC value.

¹⁵This analysis is required if the energy equivalent of the TOC assay by furnace combustion is < 75% of the DSC v

¹⁶This analysis is required if moisture analysis by TGA exceeds the notification limit.

-227, REV. 1

l, and Physical Analytical Requirements

in WHC-SD-WM-TP-104.

DQO. Therefore, if the DSC limit is exceeded, these analyses must be performed

Table 2: AX-102 Chemical, Radiological

LIQUID							
Project Name		AX-102 Auger Sample					
Plan Number		WHC-SD-WM-TP-227, REV. 1					Hor
							Field
PROGRAM		PROGRAM CONTACTS					Hot
A. Safety Screening		Safety Screening		H. Babad			
C. Organic		Organic		D. A. Turner			
		TWRS		R. D. Schreiber			
		222-S Laboratory		J. G. Kristofzski			
		325 Laboratory		S. G. McKinley			
PROGRAM	PRIMARY ANALYSES				SAMPLE ¹	PREP ²	
	METHOD	ANAL.	WHC PROCEDURE	PNL PROCEDURE	LIQUID		D
A,C	DSC	Energy	LA-514-113	PNL-ALO-508	X	d ⁶	ea
A,C	TGA	% H ₂ O	LA-560-112	PNL-ALO-508	X	d ⁶	ea
A,C	Hot Persulfate	TOC	LA-342-100	PNL-ALO-381	X ¹²	d ⁶	ea
A,C	Visual	Organic Layer	LA-519-151	PNL-ALO-501	X	d	N
PROGRAM	SECONDARY ANALYSES				SAMPLE ¹	PREP ²	
	METHOD	ANAL.	WHC PROCEDURE	PNL PROCEDURE	LIQUID		D
A,C	RSST ¹⁰	Energy	see 10 below	N/A	X	d ⁶	ea
A	Distillation ¹⁰	CN	LA-695-102	PNL-ALO-287 PNL-ALO-289	X	d ⁶	ea
C	IC ¹³	NO ₂ ⁻ NO ₃ ⁻	LA-533-105	PNL-ALO-212	X	d ⁶	ea
C	Titration ¹³	OH ⁻	LA-661-103	PNL-ALO-228	X	d ⁶	ea
A,C	Furnace Oxidation ¹⁴	TOC	LA-344-105	PNL-ALO-380	X	d ⁶	ea
C	ICP ¹⁵	Cr Mn	LA-505-151	PNL-ALO-211	X	d ⁶	ea
C	Gravimetric ¹⁶	% H ₂ O	LA-564-101	PNL-ALO-504	X	d ⁶	ea

²d-direct, f-fusion dissolution, a-acid dissolution, w-water dissolution

³PR-precision, AC-accuracy, ea-each, smpl-sample, DUP-duplicate, SPK/MSD-spike and matrix spike duplicate, AB-analytical batch, PB-preparation blank, N/A-not applicable, mtrx-matrix

⁴Units for notification limits and expected range are those listed in the "units" column.

⁵Dry weight basis.

⁶Direct liquid samples may be diluted in acid or water to adjust to proper sample size and/or pH.

⁷Action limit converted from weight basis assuming liquid density of 1.0 g/mL.

⁸Tracer or carrier may be used in place of a spike and results corrected for recovery.

⁹Either serial dilutions or matrix spikes will be performed.

1, and Physical Analytical Requirements

ANALYSES									
COMMENTS						REPORTING LEVELS			
Blank - Per Laboratory Discretion						FORMAT I		Early Notify	
						FORMAT II		Process Control	
						FORMAT III		Safety Screen	
						FORMAT IV		Waste Management	
						FORMAT V		RCRA Compliance	
ANK	#AUGERS	RISER#				FORMAT VI		Special	
K-102	2	3E and 9E							
QUALITY CONTROL ³						CRITERIA			FOR-MAT
	SPK/MSD	BLK	CALIB STD	PR	AC	UNITS	NOTIFICATION LIMIT ⁴	EXPECTED RANGE ⁴	
I	N/A	N/A	ea AB	±10	90-110	J/g ⁵	> 481	unknown	I, III, IV
I	N/A	N/A	ea AB	±10	90-110	wt%	< 17	unknown	I, III, IV
I	1/mtrx	ea PB	ea AB	±10	90-110	µg C/mL	> 30,000 ⁷	unknown	I, III ¹² , IV
	N/A	N/A	N/A	N/A	N/A	none	presence	unknown	I, III, IV
QUALITY CONTROL ³						CRITERIA			FOR-MAT
	SPK/MSD	BLK	CALIB STD	PR	AC	UNITS	NOTIFICATION LIMIT ⁴	EXPECTED RANGE ⁴	
I	N/A	N/A	ea AB	±20	80-120	J/g ⁵	> 481	unknown	I, III
I	1/mtrx	ea PB	ea AB	±10	90-110	µg/mL	> 39,000 ⁷	unknown	I, III
I	1/mtrx	ea PB	ea AB	±10	90-110	µg/mL	none	unknown	IV
	N/A	ea PB	ea AB	±10	90-110	µg/mL	none	unknown	IV
I	1/mtrx	ea PB	ea AB	±10	90-110	µg C/mL	> 30,000 ⁷	unknown	I, III, IV
I	see ⁹	ea PB	ea AB	±10	90-110	µg/mL	none	unknown	IV
							none	unknown	IV
I	N/A	N/A	ea AB	±20	80-120	wt%	< 17	unknown	I, IV

¹⁰RSST performed only if DSC exceeds notification limits. The RSST method, yet to be proceduralized, may be found in WHC-SD-WM-TP-104.

¹²These analyses are primary analyses for the organic DQO, but also are secondary analyses for the safety screening DQO. Therefore, if the DSC limit is exceeded, these analyses must be performed and reported within 90 days of receipt of the last sample at the laboratory dock.

¹³This analysis is required if the energy equivalent of the TOC assay by hot persulfate is > 125% of the DSC value.

¹⁴This analysis required if the energy equivalent of the TOC by hot persulfate is < 75% of the DSC value.

¹⁵This analysis is required if the energy equivalent of the TOC assay by furnace oxidation is < 75% of the DSC value.

¹⁶This analysis is required if moisture analysis by TGA exceeds the notification limit.

5.0 ORGANIZATION

The organization and responsibility of key personnel involved in this tank AX-102 characterization project are listed in Table 3. Procedures for both the WHC 222-S Laboratory and the PNL 325 Analytical Chemistry Laboratory are given in Table 2 since it is as yet undecided which laboratory shall receive the samples from tank AX-102. Analytical Services shall make the laboratory selection two weeks prior to the sampling event. The laboratory selection will be based on the ability of the laboratory to receive the samples as well as its ability to provide the required analytical data in the requested time. Once the performing laboratory is selected, Analytical Services shall send written notification to inform Sampling Operations of the Laboratory to which the samples are to be sent.

Table 3: Tank AX-102 Project Key Personnel List

Individual	Organization	Responsibility
S. G. McKinley	325 Analytical Chemistry Laboratory	Project Manager for Tank Waste Characterization
J. G. Kristofzski	222-S Analytical Operations	Program Support Manager of Analytical Operations
R. D. Schreiber	TWRS Characterization Support	AX-102 Tank Characterization Plan Cognizant Engineer
D. A. Turner	Organic Tanks Safety Program	Organic Safety Program Manager
H. Babad	WHC Characterization Program	Safety Screening Point of Contact
J. L. Deichman	Analytical Services	Manager of Analytical Services Program Management and Integration
East Area Shift Operations Manager	Tank Farm Operations	East Tank Farm Point of Contact if Notification Limit is Exceeded (373-2689)

6.0 EXCEPTIONS, CLARIFICATIONS, AND ASSUMPTIONS

6.1 EXCEPTIONS TO DQO REQUIREMENTS

In the safety screening DQO, it is specified that cyanide analyses are to be performed on a quarter-segment level and that the notification limit for the DSC analysis is 125 cal/g. However, both the soon to be released revision to the safety screening DQO and the ferrocyanide DQO (Meacham et al. 1994) have changed the requirements such that the cyanide analysis is now to be performed on a half-segment level and the DSC notification limit is 115 cal/g (dry weight basis). Therefore,

although this Tank Characterization Plan uses the current safety screening DQO, it specifies that cyanide is to be performed on a half-segment basis and that notification shall be made if the DSC value exceeds 481 J/g (115 cal/g dry weight basis).

In the organic DQO, ^{137}Cs and ^{90}Sr on half-segments are requested as secondary analyses. However, these have not been requested as primary analyses, nor are there any other primary analyses that would require ^{137}Cs or ^{90}Sr to be conducted should it exceed a notification limit. Therefore, it has been decided by both the Organic Safety Program and the Characterization Program that ^{137}Cs and ^{90}Sr on a half-segment level shall not be analyzed.

In the organic DQO, the method of analyses for principal organic species, equilibrium moisture content, and Cr and Mn oxidation states has not been developed at this time. Therefore, if it is necessary to analyze these secondary constituents, archived samples shall be used for analyses at a later date.

6.2 CLARIFICATIONS AND ASSUMPTIONS

A number of clarifications and assumptions relating to the notification limits or decision thresholds identified in the applicable DQO efforts need to be made with respect to the analyses in Table 2. Each of these issues are discussed below.

- Any exotherm determined by differential scanning calorimetry (DSC) must be reported on a dry weight basis as shown in equation (1) using the weight percent water determined from thermal gravimetric analysis.

$$\text{Exotherm (dry wt)} = \frac{[\text{exotherm (wet wt)} \times 100]}{(100 - \% \text{ H}_2\text{O})} \quad (1)$$

NOTE: A large error in the DSC value may result when converting samples containing greater than 90% water to a dry weight basis. However the conversion is still required.

- The safety screening DQO (Babad and Redus 1994) requires that additional analyses be performed if total alpha activity measures greater than 1 g/L. Total alpha activity is measured in $\mu\text{Ci/g}$ rather than g/L. To convert the notification limit for total alpha activity into a number more readily usable by the laboratory, it was assumed that all alpha decay originates from Pu-239. The notification limit then may then be calculated as:

$$\left(\frac{1 \text{ g}}{\text{L}}\right) \left(\frac{1 \text{ L}}{10^3 \text{ mL}}\right) \left(\frac{1}{\text{density}} \frac{\text{mL}}{\text{g}}\right) \left(\frac{0.0615 \text{ Ci}}{1 \text{ g}}\right) \left(\frac{10^6 \mu\text{Ci}}{1 \text{ Ci}}\right) = \frac{61.5}{\text{density}} \frac{\mu\text{Ci}}{\text{g}} \quad (2)$$

NOTE: If a density of 1.5 g/mL is assumed for solid material, the results notification limit becomes 41 $\mu\text{Ci/g}$.

- Neither the safety screening nor the organic DQO efforts, upon which the analyses in Table 2 are based, sufficiently addresses the analyses performed on any drainable liquid present. To adequately characterize the tank, all

analyses performed on the solids for the safety screening and organic DQOs shall also be performed on any drainable liquids with the exception of total alpha activity.

- Neither of the DQO efforts upon which the analyses in Table 2 are based addresses the analyses performed on field and hot cell blanks. Since none of the analyses are being performed in support of any regulatory issues or for trace amounts of analyte, no field or hot cell blanks are required (Zuroff 1994)..

7.0 DELIVERABLES

All analyses of tank AX-102 waste material will be reported as Formats I, III or IV, as shown in Table 2. The Characterization Program may request progress reports from the laboratory regarding the analyses. However, due to the rapid turn around time required for the safety screening analyses (the laboratories must report the results for primary analytes within 45 days), no special progress reports for this tank characterization project shall be required from the laboratory. All reports generated as part of normal operations (e.g., monthly reports) shall still be done. All data shall be reported by tank or by sample. The data shall be reported in the units given in Table 2. More information regarding reporting formats is found in (Schreiber 1994a).

7.1 FORMAT I REPORTING

Table 2 contains the notification limits for each analyte. Analytes that exceed the notification limits defined in the DQO processes shall be reported by calling the East Area Shift Manager of Tank Farm Operations at 373-2689 and the Characterization Program Office (Schreiber 1994b). This verbal communication must be followed within 1 working day by written communication to the Characterization Program Office, Characterization Support, Analytical Services, Organic Safety Program, the Safety Screening Representative, and Waste Tank Process Engineering, documenting the observation(s). Points of contact within each program/project are defined by Schreiber (1994c). Additional analyses for verification purposes may be contracted between the performing laboratory and the contacts above either by a revision to this document or by a letter of instruction.

7.2 FORMAT III REPORTING

A format III report, reporting the results of the primary safety screen analysis, shall be issued to the Characterization Program Office, the Safety Screening Representative, Characterization Support, Waste Tanks Process Engineering, and the Tank Characterization Resource Center (Schreiber 1994c) within 45 days of receipt of the last sample at the laboratory loading dock. The DSC and TGA scans have been requested due to the interpretive nature of the analysis. If analysis for the safety screening secondary analytes are required, these results shall be provided within 90 days of receipt of the last sample at the laboratory loading dock. No calibration data are requested for these reports. Detailed information regarding the contents of this reporting format are given in (Schreiber 1994a).

7.3 FORMAT IV REPORTING

Analytical results requested for the characterization project of tank AX-102 shall be compiled into a Format IV type data package. The data package shall be provided to Analytical Services and the Characterization Program within 216 days of the sampling event. Detailed information regarding the contents of this reporting format are given in (Schreiber 1994a).

In addition to this data package, an electronic version of the analytical results shall be provided to the Tank Characterization Resource Center and Tank Characterization Database. The data must be available to the Washington State Department of Ecology within 216 days of the sampling event, so this electronic copy must be sent at the time of data package delivery or within 209 days of the sampling event, whichever is earlier, to allow time for data entry. The electronic version shall be in the standard electronic format specified in (Bobrowski 1994)

8.0 CHANGE CONTROL

Under certain circumstances, it may become necessary for the performing laboratory to make decisions concerning a sample without review of the data by the customer or the Characterization Program. These changes shall be documented through the use of internal characterization change notices or analytical deviation reports for minor, low-impact changes and documented in applicable laboratory reports. All significant changes shall be documented by Characterization Support via an Engineering Change Notice to this Tank Characterization Plan. All changes shall also be clearly documented in the final data package.

Additional analysis of sample material from this characterization project at the request of the Characterization Program shall be performed according to a revision of this Tank Characterization Plan.

9.0 REFERENCES

- Anderson, J. D., 1990, *A History of the 200 Area Tank Farms*, WHC-MR-0132, Westinghouse Hanford Company, Richland, Washington.
- Babad, H., 1992, *An Overview of Progress Made Toward Resolving Priority One Safety Issues: Fiscal Year 1992*, WHC-EP-0606, Westinghouse Hanford Company, Richland, Washington.
- Babad, H., S. M. Blacker, and K. S. Redus, 1994, *Data Quality Objective to Support Resolution of the Organic Fuel Rich Tank Safety Issue*, WHC-SD-WM-DQO-006, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Babad, H., and K. S. Redus, 1994, *Tank Safety Screening Data Quality Objective*, WHC-SD-WM-SP-004, Westinghouse Hanford Company, Richland, Washington.
- Bell, K. E., 1993, *Tank Waste Remediation System Tank Waste Characterization Plan*, WHC-SD-WM-PLN-047, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- Bell, N. E., 1983, *Pumping of Supernatant from Tanks in B and BX Tank Farm*, (internal letter 65950-83-1664 to R. A. Zinsli, November 30), Rockwell International, Richland, Washington.
- Bobrowski, S. F., S. J. Harris, and J. D. Schwab, 1994, "Standard Electronic Format Specification for Tank Characterization Database Loader, Version 2.0", Pacific Northwest Laboratory, Richland, Washington (Transmitted by PNL Letter TCD-94-002, June 16, 1994, S. F. Bobrowski, PNL, to C. S. Haller, WHC).
- Bratzel, D. R., 1994, Letter to S. M. Joyce, "Archiving Requirements", 7E72-94-125, dated June 23, 1994.
- Brevick, C. H., 1994, *Supporting Document for the Historical Tank Content Estimate for AX Tank Farm*, WHC-SD-WM-ER-309, Rev. 0, ICF Kaiser Hanford Company, Richland, Washington.
- Conway, J. T., 1994, Letter to H. R. O'Leary, DOE, "DNFSB Recommendation 93-5 to the Secretary of Energy," 9400070, dated July 19, 1993.
- DOE, 1994, *Hanford Analytical Services Quality Assurance Plan*, DOE/RL-94-55, Rev. 0, U.S. Department of Energy, Richland Field Office, Richland, Washington.
- Haller, C. S., 1994, *Fiscal Year 1995 Tank Waste Remediation System Tank Waste Analysis Plan*, WHC-SD-WM-PLN-091, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Hanlon, B. M., 1994, *Waste Tank Farm Summary for Month Ending September, 30 1994*, WHC-EP-0182-75, Westinghouse Hanford Company, Richland, Washington.
- Horton, J. E., 1974, *Analysis and Characterization of Sludge Samples Received from Tank 102-AX*, (letter to O. R. H. Rasmussen, September 25), Atlantic Richfield Hanford Company, Richland, Washington.

- Kuhl-Klinger, K. J., 1994, *Quality Assurance Plan for Activity Conducted by the Analytical Chemistry Laboratory (ACL)*, MCS-033, Rev. 1, Pacific Northwest Laboratory, Richland, Washington.
- Meacham, J. E., R. J. Cash, G. T. Dukelew, H. Babad, J. W. Buck, C. M. Anderson, B. A. Pulsipher, J. J. Toth, and P. J. Turner, 1994, *Data Requirements for the Ferrocyanide Safety Issue Developed through the Data Quality Objectives Process*, WHC-SD-WM-DQO-007, Westinghouse Hanford Company, Richland, Washington.
- Meznarich, H. K., 1994, *Quality Assurance Program Plan for Laboratory Analysis and Process Testing*, WHC-SD-CP-QAPP-003, Rev. 1, Westinghouse Hanford Company, Richland, Washington.
- Schreiber, R. D., 1994a, Letter to C. S. Haller, "Revised Interim Tank Characterization Plan Guidance", 7E720-94-121, dated April 13, 1994.
- Schreiber, R. D., 1994b, Letter to J. G. Kristofzski, "Format I Reporting Requirement", 7E720-94-128, dated August 15, 1994.
- Schreiber, R. D., 1994c, Letter to J. G. Kristofzski, "Point of Contact/Distribution List", 7E720-94-141, dated October 11, 1994.
- Starr, J. L., 1977, *Analysis of Tank 102-AX Sludge*, (internal letter LET-072077 to J. W. Bailey, July 20) Rockwell International, Richland, Washington.
- Taylor, 1993a, *Quality Assurance Project Plan for Chemical Analysis of Highly Radioactive Mixed Waste Samples in Support of Environmental Activities on the Hanford Site*, WHC-SD-CP-QAPP-002 Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Taylor, 1993b, *Analytical Chemistry Services Quality Assurance Plan*, WHC-SD-CP-QAPP-001 Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Weiss, R. L., 1988, *Analysis of Tank 241-AX-102 Sample*, (internal memo 12712-PCL88-018 to J. A. Eacker, November 14), Westinghouse Hanford Company, Richland, Washington.
- Wheeler, R. E., 1975, *Analysis of Tank Farm Samples: Sample T-4887, Tank 102-B*, (letter to R. L. Walser, October 24), Atlantic Richfield Hanford Company, Richland, Washington.
- Whelan, T. E., 1994, *TWRS Characterization Program Quality Assurance Program Plan*, WHC-SD-WM-QAPP-025, Westinghouse Hanford Company, Richland, Washington.
- Zuroff, W. F., 1994, *Auger Trip Blanks*, (cc:Mail to R. D. Schreiber, T. E. Whelan, and G. D. Johnson, February 10, 1994), Westinghouse Hanford Company, Richland, Washington.